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AUTHOR Walker, Kim B.; Hackman, Michael Z.
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ABSTRACT

A study examined which factors of telecommunication system design and instructor style had the greatest impact on student perceptions of learning and satisfaction with televised instruction. Surveys were completed by 164 adult learners evaluating over 20 courses taken via two-way, multi-camera, telecommunications systems. Results showed that "amount of information received" was the single greatest contributor to perceived learning and satisfaction. Stepwise hierarchical results suggest that design of tele-education courses and systems should focus on how students acquire information from this technology. Results indicated that instructor nonverbal behaviors and audio and video transmission also contributed significantly to learning and satisfaction. Results also showed less significant, yet positive, effects for the ability and ease of asking questions during telecourses. Results indicated clearly that direct face-to-face contact with instructors, and interpersonal rapport with other class participants, were less important than the amount of information transmitted in distance education courses. (Four tables of data are included; 29 references are attached.) (Author/SR)

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INFORMATION TRANSFER AND NONVERBAL IMMEDIACY AS PRIMARY PREDICTORS OF LEARNING AND SATISFACTION IN THE TELEVISED COURSE

Kim B. Walker

Michael Z. Hackman

Department of Communication
University of Colorado-Colorado Springs
P.O. Box 7150
Colorado Springs, CO 80933-7150

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ABSTRACT

TITLE: Information Transfer and Nonverbal Immediacy as Primary Predictors of Learning and Satisfaction in the Televised Classroom

This study examines which factors of telecommunication system design and instructor style effect student learning and satisfaction with televised instruction. Participants in the study were 164 adult learners who were surveyed for their evaluation of over twenty courses taken via two-way, multi-camera, telecommunications systems. The study was designed to investigate which factors of system conveyance and course delivery had the greatest impact on perceptions of satisfaction and learning among students.

Among those responding, "amount of information received" in the course was found to be the single greatest contributor to perceived learning and satisfaction. Stepwise hierarchical results of this study suggest the design of tele-education courses and systems should focus on how students acquire information from this technology. Instructor nonverbal behaviors and audio and video transmission also contributed significantly to learning and satisfaction. Less significant, yet positive, effects were discovered for the ability and ease of asking questions during telecourses. Among our respondents, results indicated clearly that direct face-to-face contact with instructors, and interpersonal rapport with other class participants, were less important than the amount of information transmitted in distance education courses.

Over the past fifty years, a variety of audio-visual media have been used to extend and improve instruction. Among the most recent and advanced are two-way, multi-camera television systems. The changing demographics of student populations have made television an increasingly viable means for delivering university curricula (Arnall, 1984). Over 900 colleges offered one or more televised courses during the 1984-85 academic year (Riccobono, 1986). The Federal Communications Commission projects future growth at 100 new tele-educational systems per year (Federal Communications Commission, 1988).

Lipsky (1984) predicts that 80% of all off-campus instruction will be delivered through new information technologies by the year 2000. Despite growing demands by course consumers and increased alternatives for delivery, many resist or reject adoption of new technologies. Among most colleges and universities, the face-to-face lecture remains "the principle and venerated means of transmitting knowledge" (Waggoner, 1984, p. 7). Some institutions simply televise courses already taught on campus in what is known as a "candid classroom" format, with multi-camera, two-way audio systems (Arnall, 1984).

Given the vast alternatives and demands, why does resistance

toward adoption remain? Part is due to the confusion in the literature comparing telecourses with traditional instruction. Overall, studies have sought answers to whether the media make any difference in instructional outcomes, or if the delivery system is the deciding factor in whether instruction is successful or not. Whittington's (1987) review of over 100 studies in distance education concluded there were no intrinsic differences between traditional and televised modes of instruction.

In contrast, a study conducted by the Rand Corporation for Annenberg/Corporation for Public Broadcasting, noted important differences between telecourses and face-to-face instruction (Shavelson, Stasz, Schlossman, Webb, Hotta & Goldstein, 1986). The qualities of system adoption, course design and delivery, and teaching styles led Shavelson and colleagues (1986) to conclude that the differences in traditional and telecourses were so dramatic as to make their comparison "infeasible."

Of the studies conducted to date, none demonstrate conclusively that telecourses are the same as, or exchangeable for, face-to-face instruction. Contrary to Whittington (1987), we assume there are important differences between face-to-face and televised instruction that are worthy of investigation. Many of these differences are suggested in the social psychology of telecommunications literature (see, for example, E. Williams, 1977; Rice, 1984; Ruchinskas, 1982; Short, Williams & Christie, 1976; F. Williams, 1987). Taken together, the research suggests that system design affects whether the new media will be adopted;

and once adopted, whether users will perceive mediated communication as an adequate substitute for face-to-face engagement. Systems incorporating two-way communication capabilities and high levels of interactivity have been identified as most effective in meeting instructional needs (Ellis & Mathis, 1985; Hackman & Walker, 1990; Hough, 1984; Kozma, 1986).

Holmberg, Schuemer and Obermeier (1982) argued that mediated learning is most effective when students perceive themselves involved in a guided didactic conversation. This means that telecommunicated instruction, though non-contiguous, should contain conversation-like qualities. Other telecommunication researchers have suggested that the effectiveness of mediated transmission is influenced by the degree of "social presence" conveyed, or the ability of the media and participants to approximate the characteristics of face-to-face interaction (Short, Williams & Christie, 1976). Social presence is influenced by the delivery modes participants use for specific communication functions (see, for example, Dutton, Fulk & Steinfield, 1982; Fowler & Wackerbarth, 1980; Johansen, 1984; Reid, 1977).

Most of these studies have a common focus on the interactive characteristics of the media system, defined by Rogers (1986) as the capability to "talk back to the individual user...(like) participating in a conversation" (p. 211). Holmberg, et al., (1982) described this interactivity as enabling participants to talk back and forth, interchanging roles of sender and receiver.

Ruchinskas (1982) found that users were more satisfied with mediated interaction when norms of face-to-face interaction were met. Rice (1984) discovered that users experienced frustration with mediated interaction when high social presence was required but not met by the available medium.

Interactivity and social presence have since been described as existant in degrees, with terms like "sociable", "sensitive" and "warm" used to identify the presence of media based on the technology, the users, and the context of use (Rice & Williams, 1984, p. 57; Rogers, 1986). If a medium is used for socio-emotional functions, it will require greater presence than that used for routine task functions or purely informational exchanges. According to Rice and Williams (1984), media that do not enable adequate social presence can be compensated for with "stylistic and persuasive strategies that increase social presence" (p. 61).

The important potential differences between televised and face-to-face instruction appear to be based in the technical capabilities of the media and the users' ability to convey presence. It was our belief that in the tele-educational context, differences in system design and instructor behavior combine to impact perceptions of mediated educational experiences. Given the significance of the affect of these differences, the present study was designed to investigate the factors that are predictive of student perceptions of learning and satisfaction.

Tele-educational contexts have the potential to meet certain

socio-emotional and informational needs. The extent to which mediated instruction is determined to be comparable, or exchangeable for, traditional interaction will be dependent upon whether norms of face-to-face interaction are considered necessary.

One set of behaviors which convey social presence in the televised classroom are immediacy behaviors of the instructor, defined originally by Mehrabian (1969) as those which "enhance closeness to and nonverbal interaction with another" (p. 203). Richmond, Gorham and McCroskey (1987) identified non-verbal immediacy behaviors, and Gorham (1988) expanded the construct to include verbal-linguistic behaviors. These behaviors have since been demonstrated to significantly impact learning, and enhance closeness in the teacher-student relationship in traditional classrooms (Gorham, 1988; Kelley & Gorham, 1988; Richmond, Gorham & McCroskey, 1987); and most recently, in non-traditional mediated classrooms (Hackman & Walker, 1990).

Hackman and Walker (1990) concluded that telecommunication system variables such as clear audio and video transmission positively impact learning and satisfaction with the televised experience. Rice (1984) suggested that system design is critical to the adoption of new educational technologies.

METHODS AND PROCEDURES

Subjects

Four hundred questionnaires were mailed to students enrolled in telecourses between 1988 and 1990. Respondents were distant

learners in one of 40 telecourses, delivered via a two-way audio, multi-camera, candid classroom configuration (Arnall, 1984). Instructors presented graphics by writing on a pad or placing prepared materials under an overhead camera. Push-to-talk microphones enabled students off campus to hear the comments and questions of those students in the physically proximate classroom. The system studied in this investigation delivers courseware to fifteen industrial sites through narrowcast transmission, as well as over 80,000 local cable subscribers.

One hundred and sixty-four respondents returned surveys (a response rate of 41%). The students included in the sample were enrolled in courses ranging from Calculus, Computer Science and Aerospace Engineering, to Marketing, Political Science, and Interpersonal Communication.

Measures

Social Presence and Information Transfer. To assess the extent to which the tele-educational system in this study satisfied socio-emotional and information needs, measures of social presence and information transfer were employed. The social presence scale consisted of four dimensions focusing on student satisfaction with instructor contact, feelings of rapport and isolation, and ease of access to the classroom. Alpha reliability for the social presence scale was .73. Information transfer was assessed by responses to an item measuring satisfaction with the amount of information received in the course.

Verbal and Nonverbal Teacher Immediacy. Teacher immediacy was measured with shortened forms of the Richmond, Gorham, and McCroskey (1987) nonverbal immediacy scale, and the Gorham (1988) verbal immediacy scale. Non-verbal immediacy behaviors include gestures, postures, vocal variety, and touching. Verbal immediacy behaviors include using personal examples, asking questions, using humor, calling students by name, and praising students. Alpha reliabilities were .75 for the nonverbal immediacy scale and .77 for the verbal immediacy scale.

Video and Audio Transmission. The clarity of video and audio transmission was assessed by a three-dimensional scale incorporating clarity of instructor graphics, lecture audibility, and the ability to hear comments and questions. Alpha reliability of the video and audio transmission scale was .81.

Perceived student learning and satisfaction. Student learning and satisfaction was measured by a series of seven-point Likert scales focusing on the degree to which students felt they learned something in the course, were satisfied with the instructional televised experience, the course, and the instructor. The final item assessed the likelihood of enrolling in another course of related content.

DATA ANALYSIS

Stepwise multiple regression analyses were used to identify factors predicting perceived student learning and satisfaction in the televised classroom. Alpha was set at .001 for all analyses.

RESULTS

Much of the rationale for this study was built on whether certain factors of system design and instructor behavior could be demonstrated to impact student learning and satisfaction in the distance education telecourse. Five stepwise multiple regression analyses were computed to determine the extent to which social presence, information transfer, nonverbal immediacy, verbal immediacy, and video and audio transmission predicted perceived learning and satisfaction.

Results of the stepwise analysis (see Table 1) suggested that the strongest predictor of learning in the televised course was the amount of information received ($F = 68.45$, $p < .0001$, change in $R^2 = .47$). Nonverbal immediacy also contributed significantly ($F = 43.00$, $p < .0001$, change in $R^2 = .06$). Together, these factors contributed to 53% of the variance in perceived learning.

Information transfer was also the single greatest predictor of satisfaction with the televised instructional experience ($F = 36.60$, $p < .0001$, change in $R^2 = .32$)(see Table 2). The second most significant contributor to satisfaction was again, nonverbal immediacy ($F = 24.37$, $p < .0001$, change in $R^2 = .07$). The clarity of video and audio transmission also contributed significantly to student satisfaction ($F = 20.23$, $p < .0001$, change in $R^2 = .06$). Combined, these elements contributed to 45% of the variation in satisfaction with televised instruction.

Table 3 indicates that two factors contributed to variations in overall course rating. Information transfer ($F = 87.75$, $p < .0001$, change in $R^2 = .54$); and nonverbal immediacy ($F = 56.82$, p

< .0001, change in R^2 = .06) combined to predict 60% of the variance in student ratings of televised courses.

Three factors contributed significantly to student desire to take another course from the same instructor (see Table 4). Nonverbal immediacy was the greatest predictor ($F = 51.05$, $p <$ .0001, change in $R^2 = .40$). Information transfer ($F = 37.60$, $p <$ .0001, change in $R^2 = .10$) and social presence ($F = 27.77$, $p <$ .0001, change in $R^2 = .03$) also contributed significantly. Combined these factors explained 53% of the variation in student desire to take another course from the same instructor.

DISCUSSION

The results of this study suggest that the transfer of information from instructor to student is the primary determinant of learning and satisfaction in telecourses. In three of four regression equations reported, amount of information predicted learning and satisfaction more strongly than all other significant factors of delivery considered. Information transfer contributed to 47% of the variation in perceived learning, 32% of the variance in satisfaction, and 54% of variation in overall course ratings.

Significant, though weaker, predictors of learning and satisfaction included nonverbal immediacy, video and audio transmission, and social presence. In telecourses, our results indicated that simple transfer of information may be sufficient for learning and student satisfaction to occur. Results were suggestive that certain students will sacrifice the norms of

face-to-face communication present in the traditional classroom for the necessity and convenience of telecommunicated information. Some appear willing to trade off their socio-emotional needs for contact with instructors, rapport with classmates, etc., for the currency of telecourse information. It is highly possible that information transfer, as operationalized in this study, offset the importance of system factors and verbal immediacy. However, the perception of communication norms remains a critical criteria for face-to-face and telecommunicated modes of instruction to be considered comparable and exchangeable.

Related to the importance of information transfer, the results of this study suggest that certain stylistic instructional features positively impact telecourse learning and satisfaction. Most importantly, nonverbal immediacy was a meaningful predictor of student desire to take another course from the same instructor. This suggests that immediate nonverbal behaviors are communicated across television, and that these behaviors may translate into a para-social affinity for the instructor. It is our belief these behaviors function much as they would in face-to-face interactions. Nonverbal research has suggested that nonverbal communication and transfer of information are related, and that the nonverbal band of transmission may provide more information than the verbal band (Haase & Tepper, 1972; Mehrabian & Weiner, 1967). The high degree of learning and satisfaction predicted by instructor nonverbal suggests the relation held up in the televised context.

Indeed, telecourse students who have limited access to environmental cues may need to focus on nonverbal behaviors to a greater extent than those in the physically proximate classroom. Important nonverbal behaviors which facilitate the transference of course content include vocal variety, relaxed body posture, and facial expressiveness (Hackman and Walker, 1990).

Because the basis of our study questioned those factors which impact learning and satisfaction in distance education, the results discussed herein can be shown to have a practical and theoretical impact on the distance learning paradigm. Certainly, instructor behavior and system design make a difference, and certain technologies and techniques are more effective in extending information than others. Systems which adequately convey verbal and nonverbal cues appear to be critical. If the principle means of delivering instruction remains the lecture, those instructors who use immediate behaviors (whether naturally or strategically), will likely be perceived as more socially present and conveying more information than those who do not.

Because this study was primarily descriptive and exploratory, many unmeasured elements might also predict learning and satisfaction as well. While all factors affecting learning and satisfaction were not tested, it is quite clear the items of greatest significance in this study had less to do with technology or instructor behavior, than with information quantity and quality.

In summation, education is changing slowly to meet market necessities and technological advances. This research supports

that new delivery systems are viable for extending the traditional classroom. Based on our results, telecourse instruction may be comparable and exchangeable for face-to-face, based on several conditions of the telecourse experience. If telecommunicated instruction is to be exchangeable for face-to-face, systems must be designed for optimum verbal and nonverbal interactivity; courses must be designed for maximum information transference, and participants must experience acceptable levels of presence and immediacy. With information as the critical element of the equation, tele-education has potential for increasing levels of adoption. Telecourses may exceed levels of "comparable", to become preferable to the absence of information or the inconvenience of time and travel. As telecommunication companies have long advised, tele-education may increasingly become "the next best thing to being there."

TABLE 1

Hierarchical Regression Predicting Perceived Student Learning

	multiple R	R^2	R^2 change	Beta	F
Information Transfer	.68	.47	.47	.68	68.45*
Nonverbal Immediacy	.73	.53	.06	.28	43.00*

* $p < .0001$

TABLE 2

Hierarchical Regression Predicting Satisfaction with the Televised Instructional Experience

	multiple R	R^2	R^2 change	Beta	F
Information Transfer	.57	.32	.32	.57	36.60*
Nonverbal Immediacy	.62	.39	.07	.30	24.37*
Video/Audio Transmission	.67	.45	.06	.26	20.23*

* $p < .0001$

TABLE 3

Hierarchical Regression Predicting Overall Course Rating

	multiple R	R^2	R^2 change	Beta	F
Information Transfer	.73	.54	.54	.73	87.75*
Nonverbal Immediacy	.77	.60	.06	.30	56.82*

* $p < .0001$

TABLE 4

Hierarchical Regression Predicting Student Desire to take Another Course from Instructor

	multiple R	R^2	R^2 change	Beta	F
Nonverbal Immediacy	.63	.40	.40	.63	51.05*
Information Transfer	.70	.50	.10	.36	37.60*
Social Presence	.72	.53	.03	.17	27.77*

* $p < .0001$

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